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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/338,045	06/22/1999	MARTIN JOHN TROTTER	UK998092	9881

7590 10/27/2003
MCGINN & GOBB, PLLC.
8321 OLD COURTHOUSE ROAD
SUITE 200
VIENNA, VA 22182-3817

EXAMINER

PARDO, THUY N

ART UNIT PAPER NUMBER

2175

DATE MAILED: 10/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/338,045

Applicant(s)

TROTTER, MARTIN JOHN

Examiner

Thuy Pardo

Art Unit

2175

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 31, 32 and 38-42 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 31 and 32 is/are allowed.
- 6) ☒ Claim(s) 38-40 and 42 is/are rejected.
- 7) ☒ Claim(s) 41 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicant's Amendment filed on April 14, 2003 in response to Examiner's Office Action has been reviewed. Claims 1-30 and 33-37 have been canceled, claim 31 has been amended, and claims 38-42 have been added.
2. Claims 31, 32, and 38-42 are presented for examination.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 38-40 and 42 are rejected under 35 U.S.C. § 103 (a) as being unpatentable over **Houldsworth** US Patent No. 6,314,436, in view of **Wilson** in "Uniprocessor Garbage Collection Techniques".

5. As to claim 38, Houldsworth teaches the invention substantially as claimed, comprising:
retrieving an object pointer structure from the thread stack [tracing paths through stored data structures defined by data objects coupled by identifying pointers, lines 2-6 of the abstract];

extracting, from the object pointer structure, a reference to its corresponding object and a reference to a next object pointer structure [linked data objects within each being considered in turn and any link to an object causes an identifier to be entered in a list, and a table identifies the location of the first and last identified objects to set a range for subsequent scanning, see the abstract; see fig. 5; col. 2, lines 44-55; linking pointers, see figs. 2-5];

performing said retrieving and said extracting with respect to a next, subsequent and last object pointer structures, whereby the retrieved object references identify a root set of objects within the memory [600-606 of fig. 6; col. 2, lines 23-67; figs. 2-5].

However, Houldsworth does not explicitly teach reclaiming the memory not used by the root set of objects. Wilson teaches reclaiming the memory not used by the root set of objects ["reclaim the garbage", see page 9 and fig. 2 on page 7].

Therefore, it would have been obvious to one of ordinary skill in the Data Processing art at the time of the invention to have modified the system of Houldsworth wherein traversing the pointers carried thereby to determine the objects linked to the root objects provided thereof would have incorporated the teachings of Wilson especially reclaiming spaces of unmarked objects; the motivation being to expand and enhance the Houldsworth's system by allowing the garbage collector to recover memory used by objects no longer in use by the operating system and application programs in the computer system.

As to claim 39, Houldsworth and Wilson teach the invention substantially as claimed as specified in claim 38 above. Wilson further teaches compacting the root set of objects so that they

are contiguous in memory and updating all object pointers and references in the thread stack [2.4.1, pages 10-11].

As to claim 40, Houldsworth and Wilson teach the invention substantially as claimed as specified in claim 38 above. Houldsworth further teaches storing object pointers structures in a thread stack, each object pointer comprising a reference to an object and a reference to a subsequent object pointer in the thread stack such that the object pointer structures are a linked list [col. 4, lines 63-65] and identify a root set of objects [for a selected root object, col. 2, lines 24-25, 65]; identifying all objects referenced directly or indirectly by the root set objects [col. 2, lines 24-26, 65-67; col. 5, lines 53-60].

As to claim 42, all limitations of this claim have been addressed in the analysis of claim 39 above, and this claim is rejected on that basis.

Allowable Subject Matter

6. Claims 31 and 32 are allowed over the prior art of record.

7. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record fails to teach or suggest individually or in combination the feature of “storing a variable pointing to the previously stored object data structure at the top of the stack, using

the variable when storing a new object data structure, and updating the variable with the new object data structure reference” as set forth in the independent claim 31.

Claim 32 being further limiting to claim 31 is also allowed.

8. Claim 41 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim 41, the feature of “storing a variable referencing to the last stored object pointer; using the variable when storing a new object pointer; and updating the variable with the new object pointer reference”, taken together with other limitations of claim 40 was not disclosed by the prior art of record.

Response to Arguments

9. Applicant's arguments filed April 14, 2003 to the Houldsworth reference have been fully considered but they are not persuasive.

Applicant argues that Houldsworth does not disclose linked object references in a thread stack identifying a root set of objects for garbage collection in a computer memory.

As to this point, Examiner respectfully disagrees. Examiner believes that this feature was taught by Houldsworth. Houldsworth teaches selecting (or identifying) a root object and then traversing the pointers carried thereby to determine the objects linked to the root object [see col. 2,

lines 24-26, 65-67], and since Houldsworth teaches the method for selecting (or identifying) a root object, the means corresponding to this method is inherent in the system in order to perform such a method function.

10. Applicant's arguments with respect to claims 38-40 and 42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thuy Pardo, whose telephone number is (703) 305-1091. The examiner can normally be reached Monday through Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici, can be reached at (703) 305-3830.

The fax phone number for the organization where this application or proceeding is assigned are as follows:

(703) 746-7238	(After Final Communication)
(703) 746-7239	(Official Communication)
(703) 746-7240	(For Status inquiries, draft communication)

and/or:

(703) 746-5616 (*Use this Fax#, only after approval by Examiner, for "INFORMAL" or "Draft" communication. Examiner may request that a formal/amendment be faxed directly to then on occasions*).

Any inquiry of a general nature of relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

13. Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

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(703) 308-9051, (for formal communications intended for entry)

Or:

(703) 308-5359, (for informal or draft communications, please label

"PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington.
VA., Sixth Floor (Receptionist).

A handwritten signature in black ink, appearing to be 'Thuy Pardo', with a large, sweeping checkmark-like flourish extending from the bottom right of the signature.

Thuy Pardo
October 07, 2003